Materials Computation Center, University of Illinois

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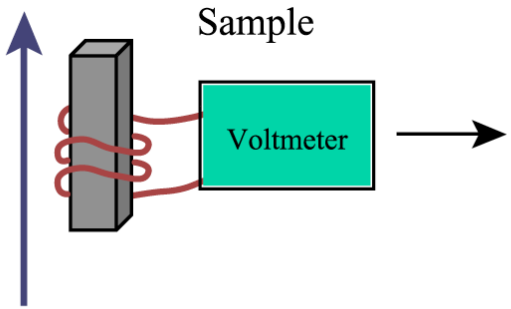
Dynamics of Disordered Nonequilibrium Systems: Hysteresis, Noise, and Domain Wall Dynamics in Systems Ranging from Magnets to Earthquakes

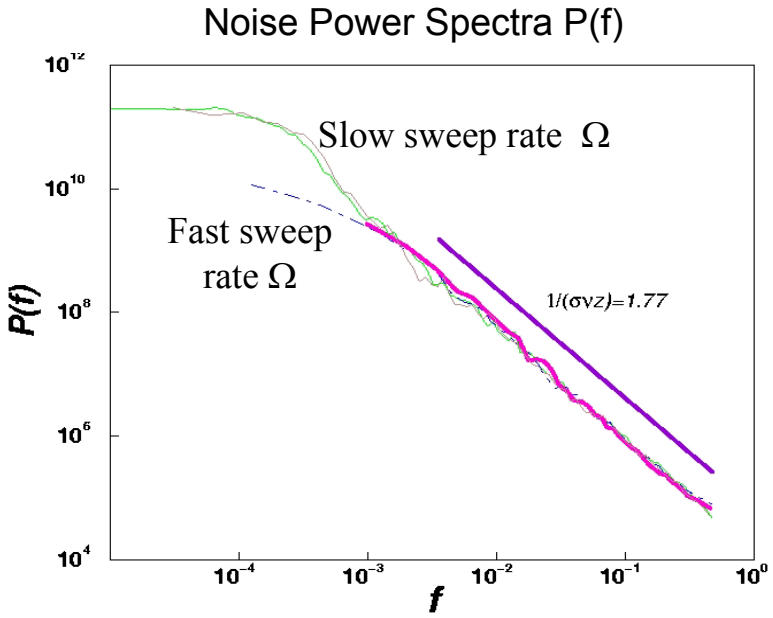
from co-PI: Karin Dahmen (co-funding from DMR 99-72783)

Research

We investigate *Crackling Noise* – a jerky response to slowly varying force – such as Barkhausen noise, superconducting vortex Avalanches, earthquakes, and shape memory alloys. Such materials all respond to an external driving force or field with crackling noise. We study *universal*, *i.e*. detail independent, effects of parameters such as the field sweep rate on power spectra of crackling noise.



Driving magnetic field ~ Ω • time



Universal scaling behavior: Power spectra for Barkhausen noise versus frequency for slow and fast sweep rates. Lines show power law scaling over several orders of magnitude.

See Travesset, White, and Dahmen, Phys. Rev. B (2002) and White and Dahmen, Phys. Rev. Lett. (2003).

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